PENGARUH PRODUK REAKSI MAILLARD (MRP) GLUKOSA – GLISIN TERHADAP PERTUMBUHAN *Salmonella typhimurium*

Dery Ardiansyah

NIM J2C 000 140

RINGKASAN

Produk Reaksi Maillard (MRP) merupakan hasil reaksi pencoklatan non enzimatis antara gula reduksi dengan gugus asam amino. Produk ini memiliki aktifitas antibakteri dan antioksidan. MRP dapat dibuat dari glukosa-glisin dengan pemanasan 100 ^{o}C selama 5 jam. MRP ini terbukti efektif menghambat pertumbuhan bakteri dalam nira tebu dan bakteri patogen *E.coli*. Namun belum ada laporan mengenai pengaruh MRP ini terhadap pertumbuhan bakteri patogen lain seperti *Salmonella typhimurium* yang memiliki sifat patogen mirip dengan *E.coli*, sehingga pada penelitian ini diteliti pengaruh MRP jenis ini terhadap *Salmonella typhimurium*.

Produk reaksi Maillard dibuat dengan mereaksikan glukosa dengan glisin dengan perbandingan mol 1:1 dalam 250 mL air pada pH 7 kemudian di refluks pada suhu 100 ^{o}C selama 5 jam. Produk hasil reaksi dikeringkan dengan alat pengering vakum pada tekanan 61 cmHg. Uji antibakteri menggunakan metode cakram kertas berdiameter 5,5 mm dengan variasi konsentrasi MRP 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, dan 120 mg/mL.

Berdasarkan pengukuran zona penghambatan, MRP memberikan efek terendah terhadap pertumbuhan *Salmonella typhimurium* pada konsentrasi 60 mg/mL. Sebagai pembanding, *Escherichia coli* dapat dihambat oleh MRP ini pada konsentrasi awal 80 mg/mL dan efektifitas hambatan MRP ini dengan ampicillin adalah 600:1. Hasil penelitian menunjukan bahwa MRP sistem model glukosa-glisin dengan pemanasan 100 ^{o}C selama 5 jam dapat menghambat pertumbuhan *Salmonella typhimurium*.

SUMMARY

Maillard Reaction Product (MRP) is nonenzymatyc browning reaction which can be produced by reaction between reducing sugar and amino acid groups. MRP have activity as an antibacteria and antioxidative. MRP can be produced by heating the glucose and glycine mixture at 100 ^{o}C for 5 hours. This MRP inhibit the growth of bacteria in sugar cane and *E. coli*. However, there have been no reports about the inhibition effect of this MRP to the growth of another pathogenic bacteria especially *Salmonella typhimurium*.

Hence, MRP was produced by heating the mixture of (1:1) mol glucose-glycine in 250 mL aquades at pH 7. This mixture was reflux at 100 ^{o}C for 5 hours. This reaction product was dried using vaccum rotavapor at 61 cmHg. The antibacterial effects was examined using paper disc method with 5,5 mm in diametre. The MRP concentration that have been used: 10, 20,30, 40, 50, 60, 70, 80, 90, 100, 110, 120 mg/mL.

According to the inhibition zone tests, this MRP giving the lowest inhibition to *Salmonella typhimurium* growth at 60 mg/mL. As a comparison, the initial concentration of this MRP to the growth of *E.coli* is 80 mg/mL and the inhibition effectiveness of this MRP to ampicillin is 600:1. The studies have revealed that MRP using glucose-glycine model system could inhibit the growth of *Salmonella typhimurium*.

DAFTAR PUSTAKA

Aminin, A.L.N., Ambarsari, L, Mochtar, H.M, 2003, *Produk Reaksi Maillard (MRP) Sebagai Antibakteri dan Pengendali Kadar Dekstran dalam Nira Tebu*, Jurnal Kimia Sains dan Aplikasi, Vol 3, No.4, hal. 3-5

Atlas, R.,1990, *Handbook of Microbiological Media*, edited by Parks, L.C., Boca Raton, United State of America, hal 666, 672.

Brock, Thomas, D., 1979, *Biology of Microorganisms*, 3rd ed, Prentice-Hall, Inc., Englewood Cliffs, New Jersey hal 24-33,222-225, 228-231.

Davies, C. G. A. and Labuza, T. P., 1994, *The Maillard Reaction: Application Confectionery Product*, Department of Food Science and Nutrition, University of Minnesota, St. Paul, Minnesota, hal 3-6, 8-29.

Davies, C. G. A. and Wedzicha, B. L, 1994, J.Food Chem., vol 49, hal 165-167.

Einarsson, H., 1988, *Inhibition of Bacterial Growth by Maillard Reaction Product*, J. Agric. Food Chemistry, vol 36, hal 1043-1047

Fessenden, J dan Fessenden, R., 1992, *Kimia Organik*, jilid 2, edisi kelima, Erlangga, Jakarta, hal 332, 364-371.

Homma, S., Tomura, T., and Fujinaki, M., 1982, *Fractionation of Nondialyzable Melanoidin into Compenents by Electrofocusing Electrophoresis*, J. Agric. Biol. Chem. Vol 46, hal 1791-1796.

Ide, Nagatoshi., Lau, B. H. S., Ryu, Kenjiro, Matsuura, H., and Itakura, Y., 1999, *Antioxidants Effects of Fructosyl Arginine, A Maillard Raction Product in Aged garlic Extract*, J. Nutri. Biochem. Vol 10, hal 372-376.

Kim, K. W. and Lee, S. B., 2003, *Inhibitory Effects of Maillard Reaction Products on Growth of the Aerobic Marine Hyperthermophilic Archeon Aeropyrum pernix*, J.Applied and Environmental Microbiology, Vol. 69, No. 7, hal. 4325-4328.

Kundinger, M. M, 2004, *Growth and Virulence Response of Salmonella typhimurium to Soluble Maillard Reaction Products*, Thesis, University of Wisconsin-Rivers falls, Texas, USA, hal 4-10.

Lee, M. S. and Nagy, S., 1983, J. Food Sci., vol 53, hal 168-176.

Martins, S. I. F, 2003, *Unravelling the Maillard Reaction by Multiresponse Kinetic Modelling*, thesis, Wageningen University, Netherlands, hal 10-25.

Mauron, J., 1981, J.Prog. Food. Nutri. Sci., vol 5, hal 5-3, 45-65.

Mottram, D. and Wedzicha, B. L., 1994, *Suggested Mechanism for the Formation of Acrylamide*

in Food, University of Reading Publisher, Great Britain., hal 4-10.

Olsen, S. J., Bishop R., Brenner F.W., Roels, T.H. Bean, N., Tauxe, R.V., and Slutsker, L., *The Changing Epidemology of Salmonella: Trends in Serotypes Isolated From Human in USA, 1987-1997*, J. Infect. Dis., vol 183, hal 753-761.

Pelczar dan Chan, 1988, *Dasar-Dasar Mikrobiologi*, jilid 2, edisi keenam, alih bahasa Hadiatomo, R.S., Imas,T.,Tjitrosomo,S.S., UI Press, Jakarta.

Poedjiadi, A, 1994, *Dasar - Dasar Biokimia*, Universitas Indonesia Press, Jakarta.

Schlegel, H.G. dan Schmidt, K., 1994, *Mikrobiologi Umum*, Edisi keenam, Gadjah Mada University Press, Yogyakarta, hal 234-238.

Sindt, J. J., **Drouillard, J.S., Thippareddi, H., Phebus, R. K Coetzer, C. M., Kerr, K. D., Lambert, D. L., Farran, T. B., Montgomery, S. P., and LaBrune, H. J.,** 2004, *Effect of Maillard reaction products on ruminal and fecal acid-resistant E. coli, total coliforms, VFA profiles, and pH in steers.* J. Anim. Sci., vol 82, hal 1170-1176.

Volk, W.A dan Wheelar, M.F., 1990, *Mikrobiologi Dasar*, jilid 2, edisi kelima, alih bahasa Adisoemarto, S., Erlangga, Jakarta, hal 97-99, 100-103.

Wolfrom, M. L. and Rooney, C. S. 1953, J. Amer. Chem. Soc., vol 75, hal 5435-5436.

Wolfrom, M. L.,Kashimura, N. K., and Norton, D., 1974, J. Agric. Food. Chem., vol 22, hal 796-800.

Winarno, 1991, *Kimia Pangan dan Gizi*, PT. Gramedia Pustaka Utama, Jakarta, hal 42-56.

Yoshimura, Y., Iijima, T., Watanabe, T., and Nakazawa, H., 1997, *Antioxidative Effect of Maillard Reaction Product (MRP) Using Glucose-Glycine Model System*, J. Agric. Food. *Chem*., vol 45, hal 4106-4109.